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OF THE BUREAU OF STANDARDS

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INTERNATIONAL ASTRONOMICAL UNION

The third general assembly of the International Astronomical Union took place in Leiden, Holland, during the week of July 5 to 13. It was probably the largest gathering of astronomers in history; representatives from 28 different countries were present.

The main work of the union was performed in sessions of its 28 commissions, each concerned with some particular phase of astronomical or astrophysical science. The Bureau of Standards was represented on the commission for standards of wave length and tables of solar spectra. The spectroscopy section of this bureau was the first to determine new standards of wave length, both in laboratory arc spectra and in the solar spectrum. These new determinations were directly responsible for the revision and adoption of two sets of international standards of wave length, one set derived from the iron arc and the other

from the sun. Both sets are based on the primary cadmium or equivalent neon standard, and the individual values are now believed to be correct to 1 part in 4 or 5 millions. Each system of standards covers approximately an octave of the spectrum, ultra-violet to red. The system of laboratory standards consists of wave lengths corresponding to about 300 bright lines in the emission spectrum of the iron arc, and the solar standards are represented by wave lengths corresponding to about 400 dark lines in the absorption spectrum of the sun. The iron standards replace a similar system which has been in international use for about a decade but which was recently found to contain systematic errors of the order of magnitude of 1 part in 1,000,000. The solar standards will replace the values determined by Professor Rowland about 40 years ago.

In addition to adopting these revised standards, the International Astronomical Union advised the investigation of

vacuum arc and furnace spectra to determine if their use will permit further improvement in laboratory standards of wave length and recommended the extension of the tables of standards to longer and to shorter waves, placing special emphasis on the importance of better standards among the very short waves.

SCIENTIFIC BY-PRODUCT OF LEVULOSE INVESTIGATION

The research on the identification of the unknown constituents of hydrolyzed inulin has resulted in the isolation and description of one well-defined crystalline substance.

Inulin, the starchlike substance found in the juice of dahlia tubers, may be converted by hydrolysis or treatment with acid into the sugar known as levulose or fructose. It was discovered that but 92 per cent of the expected amount of fructose was obtained by this hydrolysis. Since it seems probable that fructose will take its place as a large-scale commodity, it was important to learn the nature of so large an impurity in hydrolyzed inulin. By removing the fructose by precipitation with lime a residual sirup was obtained which, instead of rotating polarized light 91° to the left, as does fructose, rotated 55° to the right. This sirup proved to be a mixture of sugars none of which could be isolated. By treatment with very strong acid at boiling temperature a partial hydrolysis was effected, and it was found that the sole product of hydrolysis was fructose.

The mixture of sugars was then converted to their acetates and from the mixture one acetylated sugar crystallized and was purified and analyzed. This was then converted back to the original sugar, which was finally obtained in crystalline form. This sugar, which has never hitherto been isolated, proved to be a disaccharide composed of two molecules of fructose combined to form a compound sugar rotating polarized light to the right. It is conjectured that it is an integral part of the inulin molecule and will ultimately assist in the determination of the structure of inulin.

LINEAR THERMAL EXPANSION OF AMBER

The linear thermal expansion of a sample of amber purchased from the National Importing Co. (Inc.), of New York City, was investigated by this bureau, over various temperature ranges between 0 and 90° C. The results obtained are given in the following table:

Temperature range $^\circ$ C.	Average coefficient of expansion per degree centigrade	Temperature range $^\circ$ C.	Average coefficient of expansion per degree centigrade
0 to 15.....	0.000047	15 to 30....	0.000053
0 to 30.....	.000050	30 to 50....	.000058
0 to 50.....	.000053	50 to 90....	.000072
0 to 90.....	.000061		

Between 0 and 50° C. the coefficient of expansion of this sample of amber is about five times the coefficient of ordinary steel.

HEALTH HAZARDS IN CHROMIUM PLATING

A paper on health hazards in chromium plating, by J. J. Bloomfield, of the Public Health Service, and W. Blum, of the Bureau of Standards, was presented at the meeting of the American Chemical Society at Evanston, Ill., on August 9. This paper has now been published in Public Health Reports for September 7, 1928, and reprints may be obtained from either the United States Public Health Service or the Bureau of Standards, Washington, D. C. A brief résumé of this paper is as follows:

During the past few years chromium plating has developed rapidly, and it is now being extensively applied upon automobiles and plumbing fixtures because of its high luster and resistance to tarnish, and upon printing plates, gauges, tools, and dies on account of its extreme hardness. The bath used for chromium plating consists principally of chromic acid. During the plating process considerable hydrogen and oxygen are liberated, and these carry a spray of chromic acid into the air.

It has long been known that in the manufacture of chromic acid and chromates the operators are subject to attack, and perforation of the nasal septum and to the formation of ulcers or

"chrome holes" upon the hands or other exposed parts of the body often result. Accordingly, some provisions have been made in all chromium-plating plants for artificial ventilation and for other sanitary measures. In spite of these precautions, however, the employees in some plants have been affected in the above-mentioned ways.

In order, therefore, to determine the extent of the hazard and the best means of overcoming it, a survey was conducted in several commercial plants. This included a study of the methods and degree of ventilation, of the concentrations of chromic acid in the air breathed by the workers, and a physical examination of the latter. Although only 6 plants were visited and 23 persons examined, the results were so consistent in different plants and agreed so well with previous experience with chromates that certain tentative conclusions and recommendations are warranted.

It was found that exposure to very low concentrations of chromic acid—for example, 1 milligram in 10 cubic meters, or one-sixtieth of a grain in 350 cubic feet (which is about the volume of air breathed by a worker in eight hours)—is sufficient to cause nosebleed and nasal inflammation in a week or less. Higher concentrations or longer exposures cause extensive attack and even complete perforation of the nasal septum. This is painless, however, and the operator may be entirely unaware of the perforation. Many of the employees were found to have chromium ulcers on the hands or other exposed parts of the body. No evidence was found of injury to the respiratory tract except in the nose nor of any effect upon the digestive system or the kidneys.

While, therefore, there is a real hazard in chromium plating, it is not critical and can be entirely eliminated by suitable measures. These should include an effective system of ventilation in which the air is drawn horizontally across the plating tanks into a narrow duct in which the air velocity should be about 2,000 feet per minute. So far as possible rubber gloves, aprons, and shoes should

be worn. Frequent applications of vaseline or mentholatum salve to the nose and hands greatly reduce the danger of ulceration. All cuts and abrasions of the skin should receive regular inspection and medical treatment.

If these simple, entirely practicable measures are taken, the hazard can be practically eliminated. There is no reason, therefore, to fear any serious injuries from the extension of chromium plating that is likely to occur in the next few years.

FURTHER WORK ON LARGE GLASS DISK

Technical News Bulletin No. 130 (February, 1928) contained a description of the making of a large glass disk to be used as the mirror of a reflecting telescope. Since then the disk has been examined for strain and an 8-inch hole made through its center.

Before the glass could be examined for strain it was necessary to remove the adhering particles of brick which had fused with the glass on the lower surface. This was done with a flat steel disk using coarse carborundum and water. Although this left the surface "rough ground," it could be made sufficiently transparent for the purpose by coating it with mineral oil. The upper surface was so smooth that it needed no preparation.

The disk was stood on edge and examined for "strain" or quality of annealing by means of plane polarized light. The strain was found to be symmetrical with respect to the shape of the disk, and the maximum strain detected produced a relative retardation equivalent to 6 millimicrons per centimeter thickness. This is well within the maximum strain permissible in optical glass used in high-precision instruments.

The hole was drilled with an 8-inch brass tube attached to a radial drill press, using water and 150-mesh carborundum in the cut. Seventy hours were occupied in cutting this hole. The work could probably have been done in less time, but the possibilities of excessive local heating and breaking the glass would have been greater.

Although the quality of annealing indicated that this hole might be made without danger of breaking the glass, precautions were taken to protect the optician in case the glass did "explode." These consisted of bedding the glass on sand and surrounding it with a cast-iron ring and covering it with planks and sheet steel except for the hole through which the cutter worked. The purpose of a hole in a reflector is to permit the use of the Cassegrainian type of mounting in which the partially converged light is reflected by a secondary mirror back through the hole to the observer's position. A reflector with a hole in it can still be used with either a prime focus or Newtonian type of mounting, and hence this disk can be used for any one of the three types.

WORKABILITY OF PORTLAND CEMENT PASTES

Three methods of tests for workability of cement pastes—the extrusion cylinder, the ball plasticimeter, and the capillary tube—were discussed in Technical News Bulletin No. 132 (April, 1928). A fourth method, using the MacMichael viscometer with its modified "paddle," has been studied. This instrument was too small to permit the study of dry mortars. However, a summary of the results already obtained develops two items of interest. First, a comparison was made between the workability of the cements when tested as neat pastes, as shown by the MacMichael instrument, and also as shown by the three methods of test referred to above, which were also reported in the paper published in the Proceedings of the American Concrete Institute, "Cement as a factor in the workability of concrete," Volume XXIV, 1928, pages 43-55. There was quite good agreement in this respect between the MacMichael instrument and the capillary tube reported in the earlier paper. Secondly, at least within the scope of the instrument used, the relative results of a number of cements tested as neat cement pastes, or in a mortar of a certain proportion, may not be the same as the relative results obtained when testing the same cements in a mortar of different proportions.

TENSILE STRENGTH OF MORTAR IN BRICKWORK

A series of tests of the adhesion of mortar to sand-lime brick has furnished an opportunity for comparing the tensile strength of the mortar in the brick with the strength of the same mortar in the form of standard briquettes. The results herein reported were obtained with a 1:1:6 cement-lime mortar, in which various amounts of diatomaceous earth had been substituted for equal amounts of lime. The mortars were mixed to a consistency which gave a $\frac{1}{2}$ -inch slump in a 2 by 4 inch cylinder. From each batch of mortar 6 standard tensile briquettes were cast and 10 pairs of brick joined together.

The bricks and briquettes were aged together in the air of the laboratory for 28 days, after which the tensile strength of the mortar and the adhesion of the mortar to the brick were determined. The mortar was then removed from the brick to which it adhered, separating readily in slabs about 0.45 inch in thickness. The slabs were cut into specimens about 3 by $1\frac{1}{2}$ inches, care being taken to obtain specimens both from the interior and the edge of the slab.

Saw cuts one-fourth inch deep were made at the mid-point on each side of the specimens cut from the interior of the slabs, to form a reduced section 1 inch across for the tensile tests. With the specimens cut from the edge of the slab a single cut only was made from the side opposite the exposed edge, so that this edge might be included in the reduced section being tested.

Strips of light wood placed over two layers of blotting paper were clamped to each end of the specimen. These formed grips by means of which the upper end of the specimen could be attached to a support and a container for shot attached to the lower end. Shot was poured slowly into the container until the specimen failed. The container was then weighed, and by calculation the tensile strength of the mortar in pounds per square inch was obtained.

The results are given in the accompanying table. The nature of the slabs

from which the specimens were cut was such that equal numbers of specimens could not be obtained from each mortar. In the table tensile strengths are the average of the number of tests given in the adjoining column except those of the briquets, where the figures in all cases were the average of six tests.

It will be noted that in 10 of the 11 mixes tested, the specimens from the edge of the mortar as it lay in the joint were stronger than those obtained from the interior portion of the joint. Also, in 8 of the 11 mixes the mortar specimens, both from the edge and the interior, were stronger than the same mortar in briquet form. There are several factors which may affect the strength of the mortar in masonry, so that its strength is not necessarily related to that in briquet form. Tapping and jarring as the brick are laid, pointing up the edges, and the absorption of the brick all tend to produce a denser mortar. The interior of mortar in brickwork may be kept in a damp condition longer than the mortar in briquet form, thus tending to increase the strength of a cement mortar. The surface exposure is relatively less in the masonry joint than in the briquet, and consequently carbonation from the air is less. In the particular mortars tested the factors tending to increase the strength were apparently more effective than the others. Whether this would be true of all mortars can not be predicted from the available data.

Tensile strength of mortar in brick

	Specimens from edge		Specimens from interior		Tensile strength of mortar in briquets (average of 6 tests)
	Number of specimens tested	Tensile strength (average)	Number of specimens tested	Tensile strength (average)	
		Lbs./in. ²		Lbs./in. ²	Lbs./in. ²
0.....	6	41	3	45	33
10.....	8	53	5	49	59
20.....	7	69	5	61	51
30.....	8	56	5	34	53
40.....	9	75	8	65	59
50.....	9	73	7	53	43
60.....	6	82	13	58	54
70.....	14	70	10	52	40
80.....	14	80	10	69	41
90.....	15	73	9	67	27
100.....	15	65	10	52	36

SAGGER INVESTIGATION

Technical News Bulletin No. 130 (February, 1928) gave a summary of the method of procedure being followed for developing sagger bodies according to fundamental properties.

The thermal expansion, moduli of elasticity, and rupture at room and elevated temperatures have since been determined with a view of establishing the value of the "resistance to thermal shock factor R" (described in Technical News Bulletin No. 120, April, 1927), which would give an indication of the probable life of a particular sagger body. At this writing the data obtained on the fired sagger bodies show that the resistance factor "R" gives a fairly good indication as to the life of the sagger, when subjected to repeated thermal shock, if referred to a group of bodies containing only fine grog or a group containing only coarse grog. It does not appear to apply when comparing the life of a coarse-grogged sagger with that of a fine-grogged sagger. This would indicate that the stresses set up in the fine-grogged body are of a different type than those in the coarse-grogged body.

It was also found that (1) saggars containing only a porous grog showed greater resistance to thermal shock than those containing a partially vitrified grog; (2) the rate of thermal expansion of the fine bodies was higher than that of the coarse bodies in 67 per cent of the observations, similar in 20 per cent, and lower in 13 per cent; (3) a comparison of the thermal expansion of the sagger bodies with that of the two clays composing each of the bodies shows that in 12 out of the 15 instances the combination was advantageously made with respect to either one or both clays.

Sagger bodies similar to the above have been prepared but have been fired approximately 50° C. higher. These will be tested and the results compared with those obtained on bodies burned at the lower temperature.

FIRE AND IMPACT TESTS OF SAFES

Additions to the safe-testing equipment of the bureau have been recently completed with which load can be ap-

plied to the safes before, during, or after the fire test. Such load application will be made to determine the degree of strength and rigidity of safe structure required to preserve the proper alignment of door and jambs under ordinary conditions of use. It is hoped to develop information by means of these tests that will enable detailed structural requirements to be eliminated from Federal specifications for safes and to place the strength requirement, in common with the others, on a performance basis, and thus give manufacturers greater latitude in design. Load can also be applied to safes by methods that will give information on resistance to such impacts as safes receive from failure of building walls and floors in fires.

The equipment has been further supplemented with a conditioning chamber that can be equipped for conditioning safes under given temperature and humidity conditions. The amount of water, free and combined, that the insulation of a safe will permanently retain determines to a considerable extent the effectiveness of the safe in preserving its contents from fire after a long period of use. Some manufacturers subject the safes after filling, or the filling itself, to a drying process to drive off excess moisture. In fire-endurance tests of safes conducted soon after they have been filled the weight losses from water evaporation generally range from 15 to 30 per cent of the weight of the insulation, or a water loss for the larger safes of from 300 to 600 pounds, equivalent approximately to 35 to 70 gallons. With the additional equipment it is intended to season safes, filled with the main types of insulation in use, under temperature and humidity conditions typical of those in heated buildings, to determine the extent and rate of the weight loss over a period of years.

SEVERITY OF BUILDING FIRES

The smaller structure used for burning-out tests has been rebuilt, and it is intended to conduct in it in the near future tests to determine the extent to which

the results that have been obtained with light commercial and record storage occupancies, the combustibles of which consisted mainly of wood and paper, apply for occupancies housing other materials. For this purpose materials will be introduced that have calorific values considerably above those for wood and paper, such as petroleum products, asphalt, and animal and vegetable oils.

RUBBER BINDERS FOR FOUNDRY CORE

Sand cores used in the foundry industry have played a very important part in the development of the art of molding and in the reduction of molding costs. There still remain, however, some phases of present-day foundry-core practice that may be improved upon.

Cores as generally used in the foundry at the present time owe their strength or coherence to their content of artificial bonding material and to the baking treatment which is given the core. Strength, however, is required only before casting, and easy disintegration of the sand core is very desirable after the cast metal has solidified around the sand core.

The removal of cores from the casting is an expensive, laborious, and dusty task, often requiring the use of a pneumatic chisel or other tools. Cracked castings, due to hard cores, which do not crush as the metal solidifies and core blows, due to low permeability of the cores, are sources of loss to foundries.

Recently there has been developed at the bureau a new foundry core sand binder, rubber or some allied material being used as the basis of the core binder. The outstanding advantages are: (1) The cores crush readily, falling to loose sand of their own accord, so that the core sand may be poured from the casting instead of having to be dug out. (2) The cores have greater strength than a greensand core and extend the range of jobs to which a readily crushed core may be applied. (3) The cores are not oven baked; they are merely air-dried. (4) The cores are of high per-

meability and show remarkable freedom from blowing.

The new rubber core binder consists, essentially, of a solution of unvulcanized rubber in gasoline. The amount and type of rubber binder used in making cores depend upon the type of core sand, the size of the core, and the metal to be cast around it. A core strength equivalent to that of a greensand core or baked oil sand cores can be attained by the use of the rubber binders. The new binders have proved to be successful in producing sand cores for castings of lead, tin, zinc, brass, phos-bronze, bronze, aluminum, iron, and steel.

These new rubber types of binders are discussed in considerable detail in Letter Circular No. 252, Rubber Binders for Foundry Cores, which is now ready for distribution. Address inquiries only to the Bureau of Standards.

PAPER TENSILE STRENGTH TESTERS

An article recently published in Paper Trade Journal gives the results of a study of the various types of testers used for measuring the tensile strength of paper. Because the tensile test is used extensively in determining the quality of paper and boards, and because there are several types of tensile testers on the market, the bureau thought it advisable to investigate the different types as to variations in results with the view to securing data to assist in the standardization of such instruments.

Six testers of various types were studied—three of the swinging arm or pendulum type for laboratory use, one hydraulic pressure-gauge type for laboratory use, and two of the portable type for field use. Of the three testers of the pendulum type, one was hand driven, one was motor driven, and the third was driven by water power. The hydraulic type was hand driven. The two small portable instruments were, of course, operated by hand. One of these was of a pendulum type and the other of a coil-spring type.

Seven samples of paper were used in the tests, ranging in tensile strength from approximately 6 to 30 pounds. A total

of 1,680 test specimens were used. All work was done under standard atmospheric conditions.

It was found that the laboratory pendulum type of tester was the most efficient. The test results obtained with such instruments checked each other with reasonable accuracy, and the average results were, in general, a close approximation to the real strength of the paper. The portable type of testers appeared to be sufficiently accurate for their purpose. Apparently paper tensile tests can hardly be expected to check each other closer than 5 per cent. This figure may be taken as a measure of the heterogeneity of the paper.

RAYON PROJECT

The work on rayon at the bureau has centered chiefly on the study of the effect of moisture on the strength and elongation properties. Actual work along these lines was delayed pending the development of adequate testing procedure and the design and standardization of the necessary equipment.

The method for obtaining stress-strain curves, using a multiple-strand specimen, has been refined considerably. In developing this method yarns of other textile fibers besides rayon were studied for comparison. The data obtained are being collated for publication.

This multiple strand strength method consists, essentially, of winding the yarn under controlled uniform tension onto a specimen holder which in turn may be placed in the jaws of the testing machine without further handling. It has been demonstrated that the method is simple in operation, gives accurate and reproducible results, and is sufficiently sensitive for the purposes of the main study.

Using this method, comparative results are being obtained on all four types—viscose, cuprammonium, nitrocellulose, and cellulose acetate. Different relative humidities are being used which will indicate what effect the moisture has on strength and stretch.

For the wet tests a device has been designed and built which consists of a tank built around the lower jaw of a

Scott tester. This tank is equipped with heaters and temperature control. This equipment permits the specimens to be immersed in water for definite periods of time and under controlled temperature. It is then broken without further manipulation. It has the advantage that the yarn is not handled from the time it is inserted in the jaw until the test is completed.

Some supplementary work is being done on the cellulose acetate type of rayon to determine what takes place when the rayon is boiled in water. It is recognized that a delustering action results, and that the properties of the rayon are effected in various ways. The results have indicated that little, if any, regeneration of the cellulose acetate to cellulose takes place as has been advocated in some theories.

Some preliminary work was done to determine the effect of high pressure and of cathode-ray exposures on rayon. This showed little promise and was not continued.

RADIO SIGNAL TRANSMISSIONS OF STANDARD FREQUENCY, OCTOBER TO MARCH.

The Bureau of Standards announces a new schedule of radio signals of standard frequencies for use by the public in calibrating frequency standards and transmitting and receiving apparatus. This schedule includes many of the border frequencies between services as set forth in the allocation of the International Radio Convention of Washington, which goes into effect January 1, 1929. The signals are transmitted from the bureau's station WWV, Washington, D. C. They can be heard and utilized by stations equipped for continuous-wave reception at distances up to about 500 to 1,000 miles from the transmitting station.

The transmissions are by continuous-wave radio telegraphy. The signals have a slight modulation of high pitch which aids in their identification. A complete frequency transmission includes a "general call" and "standard frequency" signal and "announcements." The "gen-

eral call" is given at the beginning of the 8-minute period and continues for about two minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letter (WWV) intervening. This signal continues for about four minutes. The "announcements" are on the same frequency as the "standard frequency signals" just transmitted and contain a statement of the frequency. An announcement of the next frequency to be transmitted is then given. There is then a 4-minute interval while the transmitting set is adjusted for the next frequency.

Information on how to receive and utilize the signals is given in Bureau of Standards Letter Circular No. 171, which may be obtained by applying to the Bureau of Standards, Washington, D. C. Even though only a few frequency points are received, persons can obtain as complete a frequency meter calibration as desired by the method of generator harmonics, information on which is given in the letter circular. The schedule of standard frequency signals is as follows, the frequencies being expressed in kilocycles:

Eastern standard time (p. m.)	Oct. 22 ¹	Nov. 20	Dec. 20	Jan. 21	Feb. 20	Mar. 20
10-10.08.....	550	1,500	4,000	125	550	1,500
10.12-10.20....	600	1,700	4,200	150	600	1,700
10.24-10.32....	650	2,250	4,400	200	650	2,250
10.36-10.44....	800	2,750	4,700	250	800	2,750
10.48-10.56....	1,000	2,850	5,000	300	1,000	2,850
11-11.08.....	1,200	3,200	5,500	375	1,200	3,200
11.12-11.20....	1,400	3,500	5,700	450	1,400	3,500
11.24-11.32....	1,500	4,000	6,000	550	1,500	4,000

¹ This schedule replaces the one previously announced for this date.

REVISION OF NATIONAL ELECTRICAL CODE

The National Electrical Code is the standard of electrical inspection for all fire insurance organizations and for many municipalities. The Bureau of Standards is represented upon the committee which periodically revises this code. The code has been revised this year, and a new edition is expected to be ready for distribution early in September. Some of the new provisions

have already been adopted as amendments to the electrical code which is in force in the District of Columbia.

Insurance, municipal, and State electrical inspectors discuss their common problems at the meetings of their organization, the International Association of Electrical Inspectors. This organization has eastern, western, and Pacific coast sections, and a new section is about to be organized covering the Southern States. The western section held its annual convention this year in Denver, sessions taking place during the week of September 10. The convention was devoted largely to discussing the changes which have been made in the National Electrical Code for the 1928 edition. Dr. M. G. Lloyd, of the Bureau of Standards, the member of the committee responsible for these changes, attended the convention and explained the desirability and justification for certain of them. Among the most important of these are the rules dealing with the protective grounding of electrical circuits and equipment, the rules relating to X-ray apparatus, neon tube signs, and other high-voltage apparatus.

BUILDING CONSTRUCTION DURING JULY, 1928

Construction contracts awarded in 36 Eastern States during July, 1928, according to the F. W. Dodge Corporation, amounted to \$564,228,600. This amount was 10 per cent above that for July, 1927, but 10 per cent lower than for June of the present year when contracts awarded were valued at \$624,224,000. The value of awards during July was greater than ever before in the same month, the fifth time a similar record has been made during the current year. The July total brought the aggregate for the first seven months of 1928 to \$3,881,774,900, higher by 8 per cent than for the corresponding period in 1927 and greater than for any similar period.

The distribution by districts of contracts awarded during the month showed a maximum increase of 35 per cent in the Chicago-St. Louis district. In the

southeastern district a 20 per cent gain occurred, and awards in the New England and Philadelphia districts were greater by 17 and 16 per cent, respectively. The decline of 12 per cent in the New York district was seven times as great in actual valuation as the loss of 24 per cent in the Minneapolis district. In comparison with July last year, indexes of construction cost and building material prices were slightly higher in July, 1928.

CITY PLANNING AND ZONING

The bureau has received from the printer the "Standard City Planning Enabling Act," Building and Housing Publication No. 11. This act was drafted by the Advisory Committee on City Planning and Zoning in response to many requests for a standard act which might be used by the various States in enacting city planning legislation. It covers the four general subjects which experience has shown to be a necessary part of planning legislation; namely (1) the making of the city plan and the organization and powers of the city planning commission, (2) the control of subdivisions, (3) the control of buildings in mapped streets, and (4) regional plan and planning commissions. Copies of this publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents each.

The bureau has learned of 57 municipalities that have enacted zoning ordinances since issuing its last report of zoning progress as of January 1, 1928. This brings the total number of cities and towns known to have zoning ordinances in effect to 640.

MANUFACTURERS' COOPERATION IN SIMPLIFICATION

In answer to the question, "Do the smaller manufacturers participate in simplification," the bureau submits that 46 per cent of the 212 producer-acceptors behind 10 simplified-practice recommendations are capitalized at \$500,000 and over, 26 per cent between \$100,000 and

\$500,000, and 14 per cent below \$100,000. The capitalization of 13 per cent of these acceptors is not reported.

Analysis of the published credit ratings of the 212 acceptors reviewed shows 41 per cent rated at \$500,000 and over, 32 per cent between \$75,000 and \$500,000, 12 per cent between \$3,000 and \$75,000, and 15 per cent "not reported." The 10 recommendations reviewed are:

	From—	To—	Reduction, per cent
No. 6. Files and rasps.....	1,351	475	65
No. 8. Range boilers.....	130	13	90
No. 18. Builders' hardware:			
Items.....	6,948	5,130	26
Finishes.....	110	29	71
No. 29. Eaves trough and conductor pipe.....	21	16	24
No. 33. Chinaware, cafeteria, and restaurant	700	243	65
No. 35. Steel lockers.....	65	17	74
No. 42. Paper grocers' bags.....	6,280	4,700	25
No. 46. Tissue paper:			
Roll tissue.....	13	5	77
No. 49. Sidewalk, floor, and roof lights:			
Shoe tissue.....	21	6	71
Sizes.....	120	6	95
Styles.....	80	5	94
Shapes.....	10	2	80
No. 57. Wrought iron and wrought steel pipe, valves, and fittings:			
Sizes of valves and fittings.....	20,000	19,238	4
Sizes of pipe.....	62	49	21

All of these have been in operation sufficiently long to permit determination of the adherence accorded them by their producer-acceptors. The average adherence—for example, per cent of product conforming to the terms of the simplification program—for these 10 is 90.3 per cent.

Since the bureau does not indorse and publish any recommendation until the latter has been accorded 80 per cent acceptance by the industry according to the volume of output, the figures above cited indicate that the smaller as well as the larger companies are cooperating in simplification. The relatively high degree of adherence to the recommendations indicates that manufacturers, large and small, are finding simplification beneficial.

SIMPLIFIED INVOICE COMING INTO GENERAL USE

Through its secretary, W. C. Fulmer, the Machinery Builders' Society reports that 80 per cent of its membership now uses, or intends to use, the simplified invoice form. Results of Mr. Fulmer's survey among his members are:

	Per cent
Now using the simplified invoice.....	52
Will use when present forms are exhausted..	28
Not using, no reasons given.....	3
No answer received.....	17

S. W. Flagg, Bureau of Methods, General Electric Co., reports that a canvass among 35 representative business associations shows 25 definitely interested in the simplified invoice and active in its promotion. Among the 25 the National Association of Wholesale Druggists reports that nearly 90 per cent of its members are using the form. Another association reports that the form is used by 10 per cent of its members; but better results are expected as time goes on.

SIMPLIFICATION IN REFRIGERATION INDUSTRY

One of the objects of the Refrigerating Machinery Association is to encourage advancement and improvement in all branches of the industry by promoting and supporting investigations, experiments, standardization, and research, and collecting and distributing statistics and information of value to the members. It also has a standing committee to formulate a program for standardization, simplification, and elimination, to the end that the association may work toward uniform standards of sizes and types of fittings, valves, and machinery parts; to provide simplification and elimination of unnecessary types and sizes; and to cooperate with similar committees of other trade, scientific, and governmental organizations. This committee is known as the Standardization, Simplification, and Elimination Committee. Recently the industry adopted a simplified-practice recommendation, S. P. R. No. 96, for ice-cake sizes. This is now before the industry for acceptance.

RESULTS OF SIMPLIFIED PRACTICE

The first of a series of reports on the effect of simplified practice in the industries in which it has been applied has just been completed by the bureau. The report is devoted to the results obtained in the paving-brick industry only, which is the oldest project of the bureau's division of simplified practice. Copies of this report may be had by readers of this bulletin upon request.

RECENT ACTIVITIES OF THE COMMERCIAL STANDARDS GROUP

Asbestos paper.—Simplified Practice Recommendation No. 19, Asbestos Paper and Asbestos Millboard, recently revised by the industry, in order that the project would be kept abreast of current practices and needs of the industry, is now in effect, as of July 1, 1928. The bureau has received signed acceptances to the revised simplification from a sufficient number of manufacturers, distributors, and users to insure the general adoption of the revised recommendation by the industry as a whole.

Asphalt.—The standing committee for Simplified Practice Recommendation No. 4, Asphalt, has reaffirmed the existing schedule of the recommendation, without change, for another year. Information presented to the meeting of the standing committee indicated an adherence to the project of 91 per cent.

Shovels, spades, and scoops.—The standing committee for Simplified Practice Recommendation No. 48, Shovels, Spades, and Scoops, has reaffirmed the existing schedule of the recommendation, without change, for another year. Information received at the meeting of the committee indicated a high degree of adherence to the project.

Skid platforms.—In accordance with the unanimous action of a general conference of representative manufacturers and users of skid platforms, the bureau has prepared and submitted, for the approval of the industry, a draft of Simplified Practice Recommendation No. 95, containing the proposed simplification

schedule for clearance dimensions of skid platforms. Copies of the recommendation and of the acceptance blank may be secured from the office of the Assistant Director, Commercial Standards Group, Room 316, Department of Commerce, Washington, D. C.

At the general conference above mentioned it was voted as the sense of the meeting that an effort be made to establish standard dimensions for over-all length and width of skid platforms, preferably in "multiple" sizes. The bureau has accordingly sent to representative users a circular explaining the various factors to be considered and requesting an expression of opinion as to the proper dimensions to be recommended.

The circular also requests information as to number and size of skid platforms used and what proportion are used for shipping goods by rail or water. The information furnished by users will be tabulated and analyzed, and the committee in charge will formulate a recommendation for presentation to a future conference.

Lead pencils.—The proposed simplification of lead pencils, promulgated by a general conference held last May in West Baden, Ind., has been submitted to the industry for approval. When a sufficient number of signed acceptances are received from the manufacturers, distributors, and users, representing at least 80 per cent of the business, by volume of annual production, the project will be printed, effective as of October 1, 1928.

Marine hardware.—A preliminary meeting of manufacturers of marine hardware was held in Portland, Me., on August 28 and 29, at which time steps were taken to initiate a survey in this industry to obtain data upon which to base a tentative simplified-practice recommendation.

Metal compartments.—At a preliminary meeting of manufacturers of metal shower and toilet partitions, held in New Britain, Conn., on August 23, a tentative simplified-practice recommenda-

tion was drafted. It is expected that this recommendation will be submitted to a general conference, bringing in architects, contractors, and other specifying authorities, early this fall.

Glass containers for drug and pharmaceutical industries.—At a preliminary conference of representatives of the drug and pharmaceutical industries and the Glass Container Association the following resolution was unanimously adopted:

That a joint simplified practice committee be appointed to make a survey and from the results obtained therefrom work out a simplified practice recommendation for various types, capacities, sizes, etc., of glass containers used in the drug and pharmaceutical industries, for consideration and adoption at a subsequent general conference of all interests, to be held under the auspices of the division of simplified practice, Bureau of Standards, Department of Commerce.

The committee is to be made up of one member from each of the 15 national associations directly interested in this program.

Beverage bottles.—A preliminary conference of representatives of the American Bottlers of Carbonated Beverages, members of the Glass Container Committee of the Beverage Allied Industries Council, members of the Standardization Committee of the Glass Container Association, and the secretary of the Crown Manufacturers Association of America convened at the Department of Commerce, under the auspices of the division of simplified practice, on August 11, 1928, to discuss the need for simplification of sizes, capacities, heights, etc., of bottles used in the carbonated beverage industry. The following resolution was unanimously adopted:

That a simplified practice committee of seven members be appointed, three members from the Glass Container Association and four from the beverage industry, to make a survey of production and demand on the various varieties and types of bottles used, and from the results obtained therefrom work out a recommended list of sizes, heights, capacities, etc., for consideration and adoption at a subsequent general conference of all interests, to be held under the auspices of the Division of Simplified Practice.

Luggage.—At the meeting of the National Luggage Dealers Association, held in New York City on August 17, a resolution was passed which carried unanimously that a joint simplified practice committee be appointed to work in co-operation with the division of simplified practice in making a survey of the industry, with the view of developing a simplified list of sizes, thereby eliminating the excessive variety in dimensions, types, etc., of trunks, suitcases, hatboxes, etc.

Staple porcelain (all-clay) plumbing fixtures.—The recommended commercial standard for staple porcelain (all-clay) plumbing fixtures, as adopted by the general conference on June 12, covering nomenclature, definitions, grading rules, dimensional standards and variety considered as staple, was disseminated for written acceptance to all branches of the industry—producers, distributors, and consumers—on August 7, 1928. Official announcement of ratification will be made upon receipt of a satisfactory majority of acceptances, and manuscript will be prepared for submission to the Government Printing Office.

Steel pipe nipples.—The recommended commercial standard for steel pipe nipples, as approved by the general conference of June 29 was submitted to the industry for acceptance on August 25, 1928. Upon receipt of a satisfactory majority of acceptances announcement to that effect will be made, and the manuscript will be prepared for printing.

Genuine wrought-iron pipe nipples.—The recommended commercial standard for genuine wrought-iron pipe nipples, as approved by the general conference of June 29, was distributed to all interests for written acceptance on August 27, 1928. As soon as a satisfactory majority of acceptances have been received announcement of ratification will be issued and the pamphlet submitted for printing.

Malleable iron or steel screwed unions.—Invitations have been issued for a general conference of producers, dis-

tributors, and consumers, at 10 a. m. Monday, September 24, 1928 in room 704 Commerce Building, Washington, D. C. to consider adoption of proposed commercial standard for 250 malleable iron or steel screwed unions. All those interested in this subject are invited to attend. Copies of the proposed commercial standard will be mailed without charge upon request.

QUANTITY PRICES FOR UNITED STATES GOVERNMENT MASTER SPECIFICATIONS

On account of the campaign inaugurated for promoting the use of United States Government master specifications, the Superintendent of Documents, Government Printing Office, Washington, D. C., has arranged for the following schedule of prices for the unbound circulars of the Bureau of Standards containing these specifications.

Number of pages	Single copy	100 copies	1,000 copies	Additional thousands
4.....	\$0.05	\$1.00	\$8.00	\$4.00
8 and 6.....	.05	1.75	15.00	8.00
12 and 10.....	.05	2.75	25.00	15.00
16 and 14.....	.05	3.25	30.00	18.00

NEW PUBLICATIONS¹

Additions to Supplementary List of Publications of the Bureau of Standards (beginning July 1, 1928)

Technologic Papers¹

- T369. Transmissive properties of eye-protective glasses and other substances; W. W. Coblenz and R. Stair. Price, 10 cents.
- T370. Cause and prevention of kiln and dry-house scum and of efflorescence on face-brick walls; L. A. Palmer. Price, 20 cents.

¹ Send orders for publications under this heading, with remittance, only to Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States, Canada, and Mexico), 40 cents (foreign).

Circulars¹

C361. United States Government master specification for oil, linseed, raw. Price, 5 cents.

C366. United States Government master specification for percale. Price, 5 cents.

Simplified Practice Recommendations¹

SPR30 (first revision). Roofing ternes. Price, 5 cents.

SPR35 (first revision). Steel lockers (single, double, and multiple tier). Price, 5 cents.

SPR58 (first revision). Classification of iron and steel scrap. Price, 10 cents.

SPR71. Turnbuckles. Price, 5 cents.

SPR79. Malleable foundry refractories. Price, 10 cents.

Technical News Bulletin¹

TNB137. Technical News Bulletin, September, 1928.

OUTSIDE PUBLICATIONS²

How to make periodic inspections of elevators. J. A. Dickerson; Power (New York, N. Y.), Vol. 68, No. 7, p. 278; August 14, 1928.

Tests of the severity of building fires. S. H. Ingberg; Quarterly, National Fire Protection Association (Boston, Mass.), Vol. 22, No. 1, p. 43; July, 1928.

Dew points of air-gasoline mixtures from distillation curves. Oscar C. Bridgeman; Industrial and Engineering Chemistry (Washington, D. C.), Vol. 20, No. 8, p. 821; August, 1928.

Regularities in the spark spectrum of hafnium (Hf II). W. F. Meggers and B. F. Scribner; Journal, Optical Society of America and Review of Sci-

¹ Send orders for publications under this heading, with remittance, only to Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States, Canada, and Mexico), 40 cents (foreign).

² "Outside publications" are not for distribution or sale by the Government. Request should be sent direct to publishers.

- entific Instruments (Ithaca, N. Y.), Vol. 17, p. 83; 1928.
- Multiplets in the Co II spectrum. W. F. Meggers; Journal Washington Academy of Sciences (Washington, D. C.), Vol. 18, p. 325; 1928.
- Strain effects in mild steel. H. S. Rawdon; Engineering News-Record (New York, N. Y.), Vol. 101, No. 6, p. 244; August 16, 1928.
- Progress report on cast iron for enameling purposes. W. N. Harrison, C. M. Saeger, Jr., and A. I. Krynsky; Journal American Ceramic Society (Columbus, Ohio), Vol. 11, No. 8, p. 595; August, 1928.
- Some standardization problems. George K. Burgess; Grocers' Bulletin (St. Paul, Minn.), Vol. 15, No. 7, p. 184; July, 1928.

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